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RESPIRATORY SIGNS AND SYMPTOMS IN TRICHINOSIS.

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ONE hundred and two case histories of trichinosis have been reviewed to determine the frequency of associated respiratory signs and symptoms which Dr. Edsall suggested may be more common

than is generally realized, and which may be so well marked as to cause difficulties in the diagnosis, particularly in the early stage of the disease before the typical eosinophilia develops.

It should be noted that rales are often found in the lungs, usually at the bases, in a variety of acute infectious diseases, depending somewhat on the height of the fever and prostration, and in this trichinosis proves to be no exception.

In the literature there is reference to abnormal respiratory signs and symptoms in trichinosis. However, all the authors quoted, as well as others, in relatively long articles, refer to these respiratory signs and symptoms only in a casual way, devoting but a sentence or short paragraph to them, except as a late or terminal complication of the disease. No attention is called to the fact that respiratory complications may obscure the true diagnosis.

Staubli¹ states that very early there develops a bronchial catarrh. He explains that this is dependent upon the invasion by trichinellæ of the respiratory muscles, bringing about their insufficiency which leads to a scanty expectoration and ultimately to bronchopneumonic processes. Staubli remarks that the sudden rises of temperature with chills may be dependent on this.

Besides the mechanical involvement and irritation of the respiratory muscles by the embryos there is good evidence from the fact that the embryos occur in the blood stream and great veins (Staubli,² Herriek and Janeway,³ Lamb,⁴ Cross⁵) to show that they may be present in the lung tissue and cause irritation of the alveoli and bronchial mucosa directly.

Thompson,⁶ in a report of 52 cases, says "cough may be present in a number of cases with a slight bronchitis, probably due to irritation of the bronchi by the parasites, but the latter were not found in any of the sputa examined."

Kratz⁷ reported a total of 337 cases. Sixty-four of his 101 deaths were attributed to disturbances of the respiratory apparatus and 14 of these had hypostatic pneumonia. Rupprecht⁸ also mentions pneumonia as a complication, especially in fatal cases.

Stiles⁹ in his description says: "The respiration becomes difficult and respiratory troubles are likely to be severe, especially in the fourth and fifth week, and there may be severe dyspnea accompanied by violent asthma." Granger¹⁰ also expresses the same view, though in his 18 cases reported no mention is made of any such

¹ J. F. Bergmann, Wiesbaden, 1909.

² Loc. cit.

³ Arch. Int. Med., 1909, iii, 203.

⁴ AMER. JOUR. MED. SCI., 1910, cxlii, 395.

⁵ Arch. Int. Med., 1910, vi, 301.

⁶ AMER. JOUR. MED. SCI., 1910, cxl, 157.

⁷ Die Trichinenepidemie zu Hedersleben, Leipzig, 1886; Berl. klin. Wchnschr., 1865, lii, 509 (quoted by Staubli).

⁸ Die Trichinenkrankheiten im Spiegel der Hettstädter Endemie betrachtet Hettstadt, 1864 (quoted by Staubli).

⁹ Osler's Modern Medicine, 1907, i, 605.

¹⁰ St. Paul Med. Jour., 1914, xvi, 399.

respiratory signs or symptoms. Steiner¹¹ mentions involvement of the respiratory muscles by the parasites and the resulting paralysis as a cause of death.

Mosler and Peiper¹² found bronchial catarrh only rarely. They do not mention pneumonia; while Leen¹³ speaks of bronchial catarrh, which may at times amount to a bronchopneumonia or lobar pneumonia, but with no reference as to what stage of the disease this occurs or with what frequency.

Staubli says that at autopsy in a large majority of cases Colnheim found a marked symmetrical bronchitis with frequent hypostatic conditions in one or both lungs but emphasizes that embolic processes are never seen: Frothingham¹⁴ found hemorrhages into the lung tissue with embryos present, as did Askanazy,¹⁵ who mentions embryos in the lung alveoli. They have never, however, been found in the sputum.

Romanovitch's¹⁶ research has demonstrated anew that the trichina sows microbes along its path as it passes from the intestinal mucosa to the thoracic duct, great veins, and general circulation, and hence that the dominant character of the infection due to trichinae is polymicrobial. He quotes Friedrich, who reports finding subcutaneous abscesses containing the trichinella, and he himself obtained positive cultures in 13 out of 23 rats killed at various intervals after infection with trichinae and in 7 out of 10 guinea-pigs. He therefore concludes that fever, abscesses, and the fatal septicemia observed in man are due to microbes inoculated by the trichinae. This offers an explanation of why lung infections may be common to this disease.

The 102 cases of trichinosis that are reviewed here have been taken from the records of the Massachusetts General Hospital (1899 to 1914), the Presbyterian Hospital in New York (1906 to 1914), and the Johns Hopkins Hospital (1899 to 1914).

The diagnosis in 70 per cent. of these cases was made by finding the embryo in excised pieces of muscle or in the blood; in 5 per cent. no parasite was found, but the muscle showed a histological picture of a myositis such as is found when trichinae are present; in 25 per cent. by the history, symptoms, and physical signs, and the eosinophilia which varied from 13 to 63 per cent. of the total leukocyte count.

Those cases in which the final diagnosis of trichinosis was in doubt or in which a chronic cardiac or pulmonary condition existed have been excluded. One case that died was excluded because of

¹¹ Boston Med. and Surg. Jour., 1908, cli, 721.

¹² Tiersche Parasiten in Nothnagel's spez. Patholog. u. Therap., 1894, vol. vi (quoted by Staubli).

¹³ Boston Med. and Surg. Jour., 1913, clxviii, 601.

¹⁴ Jour. Med. Research, 1906, xv, 457.

¹⁵ Virchows Arch., 1895, cxli, 42 (quoted by Staubli).

¹⁶ Comp. rend. Soc. de biol., 1911, lxx, 257 and 339.

an incomplete record. All of the 102 cases recovered except one, and it should be noted that although this patient had moderate dyspnea, no abnormal physical signs in the lungs were detected.

Five of these cases are of particular interest, because of respiratory complications, and are described in some detail later, leaving 97 cases which are here summarized; 8.8 per cent. of the total 102 cases (4 of the 5 cases described later and 5 of the 97 cases summarized) showed respiratory signs and symptoms severe enough to lead to the serious consideration or actual diagnosis of a purely pulmonary condition in the preliminary diagnosis.

Thoracic pain, usually in the region of the diaphragm or along the lower intercostal muscles, was not an uncommon symptom, but bore no relation to the presence of a slight or severe bronchitis, though usually when present was associated with a mild dyspnea and often with a shallow type of respiration.

The rate of respiration was usually increased with the fever to 25 to 32 per minute, reaching as high as 46, again varying with no regularity in regard to physical signs in the lungs except for the fact that those cases where the bronchitis was most marked usually had a higher rate than the others.

Of the 97 cases, 51 (50 per cent. of the total 102 cases) had no cough, nor was there any abnormality of the lungs noted in the physical examination during the first few days in the hospital or subsequently. The 46 remaining cases may be divided into three groups as follows:

I. Fifteen cases (15.3 per cent. of the 97) had cough without abnormal pulmonary physical signs, and only 3 of these raised any sputum.

II. Thirteen cases (13.6 per cent.) had not only a cough, but also abnormal physical signs were present in the lungs, though only 7 of them raised sputum. Thus 28 cases or 29 per cent. had a cough which began one to twelve days, usually about two to six days, after the earliest symptom of the disease, lasting three to twenty-five days, or through the course of the illness.

III. Eighteen cases (18.5 per cent.) had pathological physical signs of the lungs without there being reference to cough in the records.

Thirty-one cases, or 31.9 per cent. of the 97 cases (all the cases of groups II and III), showed abnormal physical signs in the lungs, which may be described as "very slight," "definite," or "well marked," according to the number of rales present.

(a) Very slight signs were noted in 11 cases, and consisted in 4 cases of rare dry rales, which are described in 2 cases as being scattered and in the other 2 as being at the bases. In 7 cases they consisted of a "few moist rales." In 3 of the 7 they were scattered, and in 4 were at the angles of the scapulae.

(b) Definite signs, that is, distinctly more numerous rales, were found in 10 cases. In 1 they were "scattered subcrepitant" and

in the 9 others moist (fine, medium, or coarse), located at the base in 4, the right axilla in 1, both apices in 1, the angles of the scapulæ in 1, and scattered in 2.

(c) Well-marked signs (rales very plentiful) were noted in 10 cases. In 2 of these the rales were of a dry type, in 1 at the bases only, and in the other "scattered all over." In the other 8 cases the rales were moist and of all varieties. In 5 of these they were everywhere in the lungs. In 2 at both bases, and in 1 at the left base only.

Ten of these 31 cases which had rales showed additional abnormal physical signs as follows:

Four had slight dulness with diminished respiration when the rales were at the bases.

At the point where the rales were most numerous, 2 showed slightly harsher breathing than normal, while 3 were noted to have suppression of breath sounds.

One case with rales at the left base showed dulness in this region and in the left axilla, where the breathing was distinctly diminished, but Roentgen-ray examination revealed only "peribronchial thickening."

The physical signs were first noted within forty-eight hours after the patient entered the hospital in 29 cases, while in the 2 others they developed within six days after admission, about eight days after the onset of the disease.

It has been difficult to tell from the records the exact duration of the abnormal signs in the lungs, though as long as the temperature remained elevated the signs persisted. However, it seems that as the temperature fell the signs began to be less and disappeared when it became normal, though in a few cases lasting some days longer. In the cases with the mildest signs they occurred only at the height of the fever and disappeared several days before the temperature was normal.

There was reference to sputum in 13 cases of the 102. No mention was made in the record of cough or sputum in one of these cases, yet a laboratory examination of sputum was noted.

In 7 cases the macroscopic examination of the sputum alone was noted; 3 were blood-tinged, of mucopurulent nature; 2 were "grayish white," while 2 were "mucopurulent."

Microscopic examination was made of 6 sputa, 4 of which grossly were "mucopurulent." At one time one of these showed blood streaks and 2 were "white mucoid."

Smears showed no tubercle bacilli in any of the sputa; many influenza bacilli were seen in 1 besides other organisms; 4 others showed a mixed growth of bacteria. The case which showed at first blood streaks in a mucopurulent sputum and later was only mucopurulent, contained many influenza bacilli. No eosinophile cells, Charcot-Leyden crystals, or parasites were discovered.

The following 5 cases, not included in the 97 cases referred to above, serve to show how pulmonary complications may obscure the diagnosis of trichinosis.

CASE I.—This illustrates how a bronchitis or mild bronchopneumonia may be a prominent feature from the onset of the disease associated with a delayed eosinophilia.

Male, negro, aged thirty-four years, works in tunnels and is subject to decompression and compression for five minutes many times a day. *Family history, past history, and habits*, unimportant.

Present illness. For three weeks he has had a cough, increasing in intensity, raising yellowish-white sputum which in the past two days has contained a little blood. During this time he has had a persistent soreness and tenderness of his legs, though not of a severe nature. Night sweats have been frequent.

For two weeks he has had a severe temporal headache, and has felt feverish, and during the past week his eyelids have been a little puffy in the morning.

Physical Examination. A well-developed negro, looking sick and coughing, having moderate tenderness of the leg muscles.

Nodes. Generally palpable. Rest of examination negative except for heart and lungs.

Heart. Normal size; sounds regular; harsh, short, systolic murmur is heard at the right second interspace, transmitted to clavicular region but not to neck. Second sounds are normal.

Lungs. Over both bases and in both axillæ, extending higher on left, are heard many fine, medium, and coarse moist rales. At a point half-way between the base of the left lung and angle of the scapula is an area of dullness where there is distant breathing of higher pitch than normal, with slightly prolonged expiration associated with a distant bronchial whispered voice.

Day in hospital.	Temperature.	Pulse average.	Respiration.
1st to 6th . . .	101.0° to 104.0°	100	30 to 25
6th to 16th . . .	98.0° to 100.0°	80	25 to 20
16th to 21st . . .	98.6° to 101.0°	85	25 to 20
21st to 33d . . .	98.0° to 99.5°	75	20

Blood: Hemaglobin, 90 per cent.

Day in hospital.	White count.	Polynuclear neutrophils and transitionals.	Lymphocytes.	Eosinophiles.	Mast cells.
1st . . .	10,500	86 per cent.	12 per cent.	2 per cent.	0 per cent.
5th . . .	...	88 "	10 "	4 "	0 "
10th . . .	9,300	80 "	8 "	10 "	2 "
17th . . .	...	69 "	13 "	18 "	0 "
27th . . .	...	60 "	25 "	15 "	0 "

Trichinæ were found in a piece of gastrocnemius muscle on the sixth day after admission.

Sputum. On entrance this was "frothy-mucoid," with some purulent particles mixed with blood. A few influenza bacilli were

present, otherwise negative. On the third to sixth day in the hospital, several examinations showed a mucopurulent sputum with many influenza bacilli. On the nineteenth day in the hospital a thick mucopurulent sputum was expectorated.

The signs present in the lungs persisted for five days, then gradually disappeared by the twelfth day. On the sixteenth day after entrance the moist rales reappeared, and on the twentieth day the area of dulness at the left base with harsh inspiration and expiration reappeared. A Roentgen-ray taken on the twenty-second day showed "the heart slightly enlarged to the right; question of dilated aortic arch. No tuberculosis." After this the lungs cleared and were quite free of rales on the twenty-ninth day.

CASE II.—This case, though exhibiting no signs in the lungs, had an onset of a respiratory nature which caused the physicians to believe for some days they were dealing with a purely thoracic disease.

Male, white, aged twenty-six years; occupation, clerk.

Family history and habits unimportant.

Past history negative except for pneumonia three years ago.

Present illness. Nine days ago he began to have a severe "cold," feeling very chilly, mean and weak since then. He has had a cough associated with slight pain in the front of the thorax, raising very little sputum; constant throbbing headache, aggravated by cough, has been persistent. There were no other symptoms.

Physical Examination. Negative throughout, except for neglected teeth with sordes and a few herpetic lesions on the lips. Temperature varied from 102° to 103°, gradually reaching normal on the eighteenth day after admission. The respiration was 25 to 30 per minute on the day of entrance. The day after 32 to 35, falling to 24 to 22 on the eighth day, and then averaging 20. The pulse during the fever was 100 to 90.

White count on entrance 11,800. (No differential count was made.)

Three days after entrance a few more herpetic vesicles developed on the lips. The record states the lungs were still negative, and the patient continues to cough a little. On this day a blood smear showed 7 per cent. eosinophiles.

Four days after entrance tenderness of the calves of the legs with pains "all over" developed.

On the eighth day marked muscle symptoms were present and a piece of excised muscle revealed trichine.

On the ninth day cough was still present, but with very little sputum. The symptoms gradually disappeared as the temperature dropped, the cough going by the eighteenth day in the hospital, when the temperature reached normal.

CASE III.—The following case illustrates an onset with respiratory symptoms. A latent tuberculosis, possibly lighted up by the

trichinosis, cannot be ruled out. It does not seem as if all the physical signs in the lungs and the respiratory symptoms could have been due to a previously quiescent tuberculosis, but that the trichinosis, which had existed for some time, was associated with a bronchitis.

Girl, aged thirteen years.

Family history and past history negative.

Present illness. Three weeks ago she "caught cold" and had a chill that night; since then she has coughed a good deal, raising small amounts of yellowish-white sputum; breathing at times has lately caused slight pains in her chest. She has felt feverish, had severe headache, and sweats frequently at night. Pains in the legs and thighs have occurred, but were not severe.

Physical Examination. Very slight puffiness of eyes and tenderness on pressure of calves of legs and lower ribs was noted on examination, which was otherwise negative except for the lungs.

Lungs. Percussion showed the note in the left infraclavicular region slightly higher pitched than on the right. In the back a doubtful slight impairment in resonance at the left apex and at both bases. Breath sounds over upper left front rougher than normal, with expiration prolonged. *Fremitus* normal. Over both backs were numerous fine moist rales and at the bases sonorous rales; a question of an occasional dry crackling rale at the left infraclavicular region was noted.

Day in hospital.	Temperature.	Pulse average.	Respiration.
1st to 5th	101.0° to 99.5°	100	20 to 24
5th to 10th	98.0° to 99.0°	80 to 70	20
10th to 30th	90.5° to 97.8°	80 to 60	20
Blood.		White count.	Eosinophiles.
On entrance		21,840	53 per cent.
Twenty-seven days later		17,120	56 "

Calmette tuberculin conjunctival test, 1 per cent. negative; Calmette tuberculin conjunctival test, 5 per cent. positive.

Stools, urine, and blood culture negative.

A very small piece of muscle excised two days after entrance showed "no trichinae."

The moist rales in the lungs were not heard after a few days, nor were the dry ones noted after the first examination. The slight dulness below the left clavicle with roughened breath sounds persisted. Neither cough nor sputum was mentioned in the record after the first three days in the ward. The tenderness of the calves of the legs and lower ribs persisted for the first week, and was not severe.

CASE IV.—The case illustrates a sudden onset resembling pneumonia.

Male, aged twenty-three years, clerk in a grocery store.

Family history, past history, and habits unimportant.

Present Illness. Twenty-four hours before admission he was seized with a sharp pain in the left side of his chest, increased by breathing and coughing. The pain shifted to the right axilla and became more severe during the night. There has been some cough without expectoration. He had a chill this morning and one just after admission. He has felt feverish and prostrated since the onset.

Physical Examination. A well-developed and nourished man, appearing acutely ill, lying quietly in bed. Temperature, 103; pulse, 108; respirations, 30. The examination was negative except for much mucus in the throat, and the lungs showed some dullness in the right upper axilla, with slight whiffy bronchial expiration, but nothing definite.

Day in hospital.	Temperature.	Pulse.	Respiration.
1st to 6th . . .	104.0° to 100.0°	110 to 78	30 to 20
6th to 12th . . .	101.0° to 99.0°	100 to 75	24 to 20
12th to 17th. . .	98.2° to 99.2°	88 to 74	24 to 20

The Roentgen-ray, upon the day of entrance showed "throughout greater portion of right lung shadow there is slight increase in density, and there are patches which strongly suggest early tuberculosis—slight irregularity in diaphragm shadow."

Five days after entrance all tendon reflexes were absent except the right knee-jerk and both triceps, which gave but a feeble response; and the note reads, "The signs in the lungs become no clearer; dullness on right side slight, but persists; breathing thought to be increased in apex of right axilla and interscapular region." The patient was quite cyanotic at this time. The record makes no further mention of the lungs or gives clinical notes of importance. No rales were ever present. The patient was discharged "well" sixteen days after entrance.

	Blood, white count.	Polynuclear neutrophils.	Lymphocytes.	Eosinophiles.	Mast cells.
On admission . . .	11,000	67 per cent.	23 per cent.	8 per cent.	2 per cent.
Six days later . . .	..	72 "	19 "	9 "	0 "

Reds, 4,950,000; hemoglobin, 90 per cent.

The urine, stool, Wassermann, von Pirquet, and blood cultures were all negative.

Muscle excised nine days after entrance showed a distinct myositis with wandering cells and eosinophiles, and the muscle fibers show various stages of degeneration. Diagnosis: "myositis due to trichinae."

CASE V.—This case resembles pneumonia. Unfortunately satisfactory history was not obtained, owing to his nationality; and a specimen of muscle was unobtainable. The diagnosis here is based on the eosinophilia.

Male, aged forty-four years, Italian laborer.

Family and past history unrecorded.

Present Illness. For two weeks he has felt sick and had a bad cough. During the past week he has been in bed with increasingly severe cough, chilly sensations, constant headache, and pains all over his body, especially in his legs.

Physical Examination. Well-developed man looking acutely ill and anxious, breathing rapidly, forty to the minute. The examination was entirely negative except for pyorrhea, sordes of teeth, and a heavily coated tongue. The temperature ran irregularly 101° to 103° in the morning, falling to 100° to 99° in the afternoon for the first ten days after admission, gradually declining after the first eight days. The following eleven days the temperature was normal. The pulse averaged 82 during the pyrexia and 74 when the temperature was normal. The respirations ran from 28 to 34 in the morning during the first eight days, except that in the first two days they were 44; in the evening they ran from 22 to 18 (perhaps due to morphin). With the descent of the temperature the respiration returned to normal.

Three days after admission a few moist rales without other signs were noted in the lower right axilla at the bases. The spleen was just palpable, otherwise examination remained negative. Nine days after admission a note states that "the patient continues to have a hacking cough, raising a little yellowish material." The lungs showed some scattered rales at the bases, present the next day also, though it is not stated when they cleared.

The patient was discharged twenty-two days after admission, having shown no abnormal symptoms or signs after the sixteenth day. No reference is found in the record of positive or negative evidence of muscle tenderness or other symptoms of trichinosis.

Day in hospital.	Blood, white count.	Polynuclear neutrophils and transitionals.	Lymphocytes and large mononuclears.	Eosinophiles.
2nd	25,600	91 per cent.	9.0 per cent.	0.0 per cent.
10th	20,600	22 "	9.5 "	68.5 "
12th	27,000	26 "	11.0 "	63.0 "

Blood cultures, Widal's for the typhoid group, sputum, urine, and feces were all negative.

From the above group summaries of the histories and physical signs in these cases it may not appear evident that there was sufficient reason for being misled at first as to the diagnosis. It is evident, however, from the complete records that such was the case. In the two cases that we personally had the opportunity to see and in another in regard to which we talked with the physician in charge, such certainly was the case, the pulmonary symptoms entirely obscuring the more ordinary ones of trichinosis for a time. It is quite probable that but for the hospital routine blood examina-

tion the proper diagnosis would never have been reached in some of the cases.

In Case I, which was seen by both of us, though the record states that the patient had muscle tenderness, it was not at all prominent when compared to the picture of an evidently sick man persistently coughing and whose lungs were filled with rales. Later when 4 per cent. of eosinophiles were found the muscle tenderness was given more consideration, which led to the finding of trichinae in the excised muscle. For the first few days certainly the lung symptoms obscured everything else.

Case II had a history not unlike pneumonia: the patient looked sick, had a high temperature, rapid respiration, and labial herpes. It was not until the eosinophilia and muscle symptoms developed that trichinosis was considered.

In Case III trichinosis was made the probable diagnosis at entrance, owing to the high percentage of eosinophiles; yet the history given by the patient and her family was of purely respiratory character, and she exhibited well-marked signs of a bronchitis. The pains in the legs and edema of the eyes were both slight and noted only after finding the eosinophilia.

Those who saw Case IV felt at first they were dealing with a pneumonia, owing to the acute onset of symptoms of respiratory nature, with fever and signs in the lungs. Trichinosis did not occur to them until the second differential count of the white cells was made. The pulmonary signs might be explained by an old tuberculosis.

Again, Case V resembled pneumonia. The history was purely respiratory, the respiration high, and rales were present in the lungs. Trichinosis was not considered until the high eosinophilia was found on the tenth day after entrance.

CONCLUSIONS. In the literature, abnormal respiratory signs and symptoms in trichinosis have been noted, but without emphasis on the fact that they may obscure the diagnosis, especially when the patient is first seen. Bronchitis, bronchopneumonia, and lobar pneumonia have been spoken of, especially as a terminal event and chiefly in the earlier reported cases in Germany.

In 50 per cent. of the 102 cases studied there is no mention of cough or abnormal lung signs at any time during the course of the disease, but in the remaining 50 per cent., 16 cases (15.6 per cent.),¹⁷ had cough without abnormal physical signs in the lungs, while 17 (16.6 per cent.) had cough with abnormal lung signs, making 33 cases (32.3 per cent.) that had cough beginning one to twelve days (usually two to six) after the onset of the disease and lasting three to twenty-five days or throughout the course of the illness; 18 cases (17.6 per cent.) had abnormal signs in the lungs but without

¹⁷ This and the percentages given below are percentages of the total 102 cases.

cough, making 35 cases (31.5 per cent.) that had abnormal physical signs in the lungs. These physical signs were present within forty-eight hours after the patient entered the hospital in 32 cases (31.5 per cent.), and in 3 cases (2.9 per cent.) within six days. The duration of these signs seemed to depend on the length of time the temperature remained elevated, the signs disappearing as the temperature fell. If the signs were slight, they existed, as a rule, but for a few days, and only at the height of the fever.

Nine cases (8.8 per cent.) showed respiratory signs or symptoms, or both, severe enough to lead to a serious consideration or actual diagnosis of a purely pulmonary condition during the first few days the patients were in the hospital.

This percentage of cases leading to error in the diagnosis is greater than is usually recognized.

We acknowledge our indebtedness to Dr. Janeway, Dr. Langcope, and Dr. Edsall for permission to use their hospital records.

A TEST OF MYOCARDIAL EFFICIENCY, WITH REVIEW OF ONE HUNDRED AND TWENTY-SEVEN CASES.

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SOME two or three years ago my attention was called to the fact that variation in systolic blood-pressure in relation to posture and exercise might be interpreted in terms of myocardial efficiency. Since then I have used a certain uniform method in a sufficient number of cases to warrant a review. Not all cases were studied in this manner, nor were any studied with the intention of tabulation. From the beginning the method has grown in favor, and I have come to look upon the blood-pressure picture—that is, the relation to each other of pulse, systolic, diastolic, and pulse pressure taken with the patient reclining and fully relaxed and again standing after light exercise—as a fair indication of myocardial efficiency. In these determinations I uniformly take the pulse, systolic blood-pressure, and diastolic blood-pressure with the patient reclining and fully relaxed; then I have him walk at his ordinary speed four times the length of my office, about 75 feet, and repeat the test in the standing position. This exertion is not sufficient to cause such subjective symptoms as dyspnea, palpitation, or chest pain unless the heart muscle be much impaired. It should not do this. It is a postural test plus sufficient exertion only to mildly stimulate the cardiovascular system.